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Mr. D. H. Campbell spoke of the germination of *Marsilia Egyptiaca*. Of spores from herbarium specimens eleven years old, fifty per cent. germinated, and of those five years old, almost all grew. From 10-12 hours suffices for the germination and complete formation of male and female prothallium.

The committee for nominating officers for the ensuing year reported, naming for President, T. J. Burrill, of Champaign, Ill.; for Secretary and Treasurer, D. H. Campbell, of Detroit. They also recommended the establishment of the office of Vice-President, and nominated B. D. Halsted, of Ames, Iowa. The report was adopted and the officers elected.

Dr. Vasey sent to the club a report of progress of the Botanical Exchange Club. (See p. 240.)

TUESDAY, 9 A. M.—W. R. Lazenby spoke of the flora of Ohio, referring chiefly to that of Franklin county, which showed 714 Phanerogams, and not a single Ericad.

F. L. Scribner made some remarks concerning *Andropogoneæ*, referring to Hackel's forthcoming work. [This paper will be published later in the GAZETTE, together with citations of herbarium numbers, so as to make it immediately available to American botanists.—Eds.]

Changes in host plants, induced by *Puccinia graminis*, were discussed in a paper sent by V. M. Spalding. The leaf where affected is three times as thick as elsewhere. In wheat the epidermal cells are often enlarged and ruptured. Contents of cells show chlorophyll bodies decomposed. He referred also to the changes in the grain.

M. B. Waite spoke of changes in the fungus flora near Champaign, Ill.

W. J. Beal gave an account of the flowering plants of Northern Michigan.

Abstracts of the botanical papers read before section F of the A. A. A. S., at the 37th meeting, Cleveland, Aug. 15-22, 1888.

A plea for uniformity in biological nomenclature: by N. L. BRITTON.

The paper cites the discrepancies in the application of the law of priority in the binomial and trinomial citation of organisms and urges a method to secure uniformity.

[Dr. Britton is absent in England, and his paper did not reach the section. As only the above extract was read, there was no discussion.]

A study of Hydrangea as to the objects of cross-fertilization:
by THOS. MEEHAN.

The author detailed a number of facts connected with the structure and development of allied species of *Hydrangea*, and argued that on no theory of evolution based on adaptation to insect visits could these changes occur. He contended that variety must exist in order to provide for order, and that variations, as we see in *Hydrangea*, can be of no special benefit to the plant, but exist for mere variety's sake.

A phase of evolution: by E. LEWIS STURTEVANT.

Botanical varieties are the unit of evolutionary progress under vegetable culture, as evidenced by a study of cultivated and wild dandelion. Colored drawings and herbarium specimens were exhibited demonstrating the substantial identity of garden varieties with wild varieties, and, conversely, showing the types for new future varieties.

[Discussed by Messrs. Campbell, Tracy, Riley, Lazenby and Meehan.]

Notes on the inflorescence of Callitriche: by JOS. SCHRENK.

The bracts of the inflorescence, which Caspary calls stipules and Schenk calls trichomes, the author finds to be bladders filled with air and with walls of a single layer of cells. The cavity of these organs is schizogenous and they are equivalent to phyllomes. Their purpose is to give necessary buoyancy to the apex of the stem. A study of the histology of the flower-cluster makes the author believe that the stamen and pistil constitute one flower, so that it is not monœcious, as described, but perfect.

[In the absence of the author, the paper was read by the Secretary. No discussion.]

Hygrosopic movements in the cone-scales of Abietinæ: by
ALBERT N. PRENTISS.

In most of the *Abietinæ*, soon after the maturation of the cones, the persistent scales fold backward or outward from the axis to permit the ripened seeds to escape. The scales are very sensitive to moisture, and in many species exhibit very rapid movements when wet, as with rain. This is especially well seen in the cones of *Tsuga Canadensis*, in which the widely-open scales become completely closed in twelve minutes. This property of the cone-scale is found to be very efficient, first, in loosening the winged seeds from the scale which bears them, and second, in favoring the wide

dispersion of the seeds, as the cones open and close many times before all the seeds are sown, thus securing their transport in different directions by the varying winds.

[The above abstract was read by the Secretary. No discussion.]

Some new facts in the life-history of Yucca and the Yucca moth:
by THOS. MEEHAN.

The author gave some figures in regard to the time of opening and the duration of the flowers, with notes on the time and duration of the moisture exudation from the perianth. The cause of the sudden stoppage of the waste was discussed, and some remarkable facts in connection with *Pronuba yuccasella*, observed by Dr. Riley, confirmed. The remarkable adaptation by which an insect is made to do the work of self-fertilization which the plant could just as well do for itself was contrasted with similar observations in the animal kingdom.

[At the suggestion of Mr. Barnes, the President of the section, Dr. Riley, replied to the paper. He restated the facts, which had been demonstrated conclusively, that *Yucca* was incapable of self-fertilization, and that *Pronuba* cross-fertilizes the flowers and oviposits in the pod. He cited Trelease's observations on the nectary, showing that the moth gets no reward in nectar for this work. He characterized Mr. Meehan's conclusions as totally unjustifiable. Mr. Day remarked that his plants of *Yucca* were self-sterile, and he had no hesitation in saying that they were functionally dioecious.]

On the cause and significance of dichogamy in flowers: by
THOS. MEEHAN.

The author repeated the announcement of his discovery, made first through the *Proc. Phil. Acad.*, that it takes a longer-continued amount of heat to excite growth in the female than in the male organs of flowers, and that varying seasons will therefore advance or retard the several sexual organs accordingly. Therefore, there is absolutely nothing in connection with the visits of insects to account for dichogamy, which is solely an accident of climatic environment.

[In the discussion which followed, Messrs. Day, Fernow and Barnes wholly dissented from the conclusions reached by the author.]

Adaptation in the honeysuckle and insect visitors: by THOS. MEEHAN.

The author gave all the points in the flowers of certain

honeysuckles, and the development of the extraordinary amount of nectar from which the plant derives its common name, and showed that the insects which visit the flower for the sweet secretions take no part in the pollination of the flower. This office is performed by pollen-gathering insects for which no special adaptation has been made, and which rather aid self- than cross-fertilization.

[Discussed by Messrs. Tracy, Day, Lazenby, Campbell, Burrill, Barnes, Sturtevant and Riley, most of whom disagreed with the deductions of the author.]

Systematic position of the Rhizocarpeæ: by DOUGLAS H. CAMPBELL.

The paper gave an account of the author's studies in the embryology of Pillularia and allied forms, which show the Rhizocarpeæ to be more nearly related to true ferns than heretofore supposed. The more intimate researches were carried on by means of paraffin imbedding and serial sections. The older literature was cited, and much shown to be erroneous on account of unsuitable methods.

[The work was commended by Messrs. Barnes and Burrill.]

Pollen germination and pollen measurement: by BYRON D. HALSTED.

I. The author, in studying the germination, sought to improve upon the methods, and after considerable trial adopted for holding culture liquid the artists' well-slabs, containing as large a number of wells as possible of such size that they can be covered with thin glass. The advantages are obvious in the comparison of various sorts of pollen under the same conditions or of the same sort in various solutions.

II. The second part of the paper gave measurements of various pollens, both moist and dry.

[No discussion.]

Comparison of the Flora of eastern and western Michigan in the latitude of 44° 40': by W. J. BEAL.

The paper describes the climate and topography of the lake shores in the locality named. The following northern plants were found on the east side of the state, and not on the west side:

Ribes lacustre Poir.
Kalmia angustifolia L.
Kalmia glauca Ait.
Dracocephalum parviflorum Nutt.
Picea alba Link.
Sparganium simplex Hudson.

Carex Backii Boott.
Carex sterilis Willd.
Carex capillaris L.
Carex Houghtonii Torr.
Botrychium Lunaria Swartz.
Botrychium simplex Hitchcock.

The following southern plants were found on the west side and not on the east:

Acer dasycarpum Ehrh.
Rubus occidentalis L.
Sambucus Canadensis L.
Sassafras officinale Nees.

Ulmus fulva Michx.
Ulmus racemosa Thomas.
Adiantum pedatum L.

These lists, so far as they go, support the prevailing belief that the west side of the state has the milder climate, a view based upon the fact that tender fruits thrive better on the west than on the east.

[No discussion.]

Observations on the succession of forests in northern Michigan:
by W. J. BEAL.

After referring to various unsatisfactory and unscientific theories as to the cause of the change in the character of a forest when a "second growth" appears after clearing or burning of the virgin forest, the author gives an account of his observations in various localities in Michigan. In a virgin forest there are, in addition to the Coniferæ, scattering trees of maples, oaks, ash, aspen and various shrubs and deep-rooted perennial herbs. The young deciduous trees are small and spindling, and almost always come from clustered roots called "grubs," showing that the present growth is not the original sprout, but the second, third or fourth from the same root. Often smaller plants, only a few inches high and less than an eighth of an inch in diameter, are found, which show by the bud-scale scars that they are four to ten years old. It is not difficult to find oaks under eighteen inches high that are twenty or more years old, and, as the present may be the third or fourth sprout, it is not improbable that the root is sixty to one hundred years old. All the deciduous trees named show the same mode of growth, while the young hemlocks and pines do not behave so. On examining "stump lands" which had just been burned over, abundant shoots of the deciduous trees named were found coming up from the stumps or roots, but no pines or hemlocks. Older stump lands show the same facts, the young deciduous trees, however, being larger.

On "jack-pine plains," where the second growth is still predominantly the jack-pine, seventy-two species of plants are quite uniformly observed, of which sixty-eight are perennials, including among trees two aspens, three oaks and one pine, with occasionally two other pines. Of the trees, the oaks survive fires in the way above indicated, the aspen

seeds are easily blown in by the wind, and seeds of the occasional pines come from neighboring territory. *Pinus Banksiana*, however, is specially adapted to seed itself in the same place by the persistent closure of the cones, which are borne even by very young (five-year old) trees. Only unusually dry weather, the death of the tree or the heat from a fire will cause the scales to open and allow the seeds to escape. Of seeds 2-4 years old, 95 per cent. germinated; from 4-6 years old, 85 per cent.

Thus, when the second growth is different from the first, it is explained by the persistence of the deciduous trees already present or the introduction of new species in the ordinary course of seed-distribution. When it is not different it is because the species of pine is specially adapted to reestablishing itself.

[After a few questions, further discussion of the paper was postponed until Monday morning, when Mr. Fernow wished to speak upon it. He was called away suddenly, however, and the discussion was not resumed.]

Discovery of the production of immunity from contagious diseases produced by chemical substances formed during bacterial multiplication: by D. E. SALMON.

The author discussed and answered objections to this theory of immunity, which was presented to the Association in 1886. MM. Duclaux, Roux and Chamberland endeavor to minimize his discovery and claim priority, though their work is more recent. The early experiments were defended and their demonstrative character shown. The author, therefore, continues to claim priority.

[No discussion.]

BRIEFER ARTICLES.

The Botanical Exchange Club.—As there is no regular committee to report on the Exchange Club, and as that club owes an account of itself to its parent, the Botanical Club of the A. A. S., the following informal report has been prepared:

At one of the sessions of the club held during the New York meeting of the A. A. S., the Rev. Thomas Morong suggested that a botanical exchange club, similar to those existing in Europe, be formed in this country. The suggestion met with the hearty approval of many members of the club. A committee, consisting of Dr. George Vasey, Dr. Sereno Watson, Dr. N. L. Britton, Rev. Thomas Morong and Prof. Byron D. Halsted, was appointed with power to act for the club, and to report